EE565: MOBILE ROBOTICS

LAB # 1: INTRODUCTION TO ROS

DESCRIPTION & MOTIVATION

This lab is designed to familiarize students with basic concepts of ROS framework – topics, nodes, messages, services, etc. We will use ROS Indigo on Ubuntu 14.04. Students will perform basic ROS tutorials on pre-configured lab PCs. By the end of lab, students will have written codes for ROS publisher and subscriber nodes, and used those to communicate with certain messages.

IN-LAB TASKS

1. Short introductory presentation about ROS and its applications in Mobile Robotics.
2. Every student will perform selected beginner ROS tutorials.
    a. Installing, configuring and navigating ROS Filesystem.
    b. Creating, building ROS packages using catkin.
    c. Using ROS messages and services.
    d. Using rqt_console and rviz.
    e. Writing publisher and subscriber nodes.
    f. Writing service and client nodes.
    g. Using rosbag for recording and playback.
3. Run turtle-sim tutorials for iRobot.

LAB ASSIGNMENT (SHOW WORKING CODE BEFORE NEXT LAB)

1. Run the node "turtlebot_teleop_key".
    - Use arrow keys to move the 2D turtlebot. This node will keep publishing the command velocity of the robot in the form of linear and angular velocities in the topic "/cmd_vel".
2. Write a client node 'A' that subscribes to '/cmd_vel', and upon each update it will calculate the robot's absolute position and orientation assuming the initial pose of robot to be (0, 0, 0). Here, you will use 2D transformation studied in class to get global pose from linear and angular velocities.
3. Node A will call a service in node 'B' whose job is to simply print the robot's position and orientation vector (x, y, θ) in command terminal.
4. Bonus: Keep track of previous robot positions in node 'B' and use that to visualize 2D trajectory of the robot's path in rviz.